



US009178299B2

(12) **United States Patent**
Alexia et al.

(10) **Patent No.:** **US 9,178,299 B2**
(45) **Date of Patent:** **Nov. 3, 2015**

(54) **DEVICE COMPRISING AN ELECTRONIC CONNECTOR TO ESTABLISH A CONNECTION WITH AN ELECTRONIC DEVICE**

USPC 439/534
See application file for complete search history.

(71) Applicant: **DXO SA**, Luxembourg (LU)

(72) Inventors: **Jean-Marc Alexia**, Alfortville (FR);
Amaury Tremblay, Versailles (FR);
Justin Michael Beck, Palo Alto, CA (US);
Todd Elliot Lewis, Corvallis, OR (US);
Tae In Um, Sunnyvale, CA (US);
Daniel Zisuk Lee, Queensbury, NY (US)

(73) Assignee: **DXO LABS SAS**, Boulogne Billancourt (FR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 96 days.

(21) Appl. No.: **14/223,566**

(22) Filed: **Mar. 24, 2014**

(65) **Prior Publication Data**

US 2015/0270636 A1 Sep. 24, 2015

(51) **Int. Cl.**
H01R 13/60 (2006.01)
H01R 13/44 (2006.01)
H01R 13/56 (2006.01)
H01R 13/62 (2006.01)

(52) **U.S. Cl.**
CPC **H01R 13/44** (2013.01); **H01R 13/56** (2013.01); **H01R 13/62** (2013.01)

(58) **Field of Classification Search**
CPC H01R 13/44; H01R 13/56; H01R 13/62

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,781,232 A * 7/1998 Ejima H04N 5/772
312/276
8,113,873 B1 * 2/2012 Sarraf H01R 13/6315
439/533
8,721,356 B2 * 5/2014 Webb G06F 1/1632
439/248
8,821,173 B2 * 9/2014 Carnevali G06F 1/1632
361/679.41

* cited by examiner

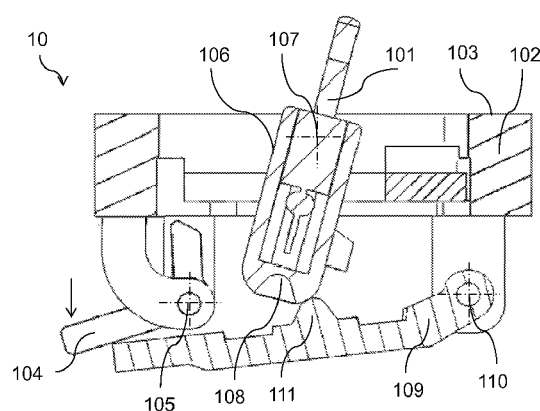
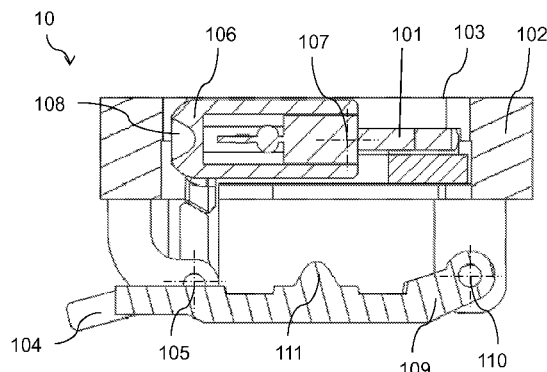
Primary Examiner — Hien Vu

(74) *Attorney, Agent, or Firm* — Im IP Law PLLC; C. Andrew Im

(57) **ABSTRACT**

A device for establishing a connection with an electronic device comprises a connection device, a lever and a pedestal having a face comprises a latch having a degree of rotation with the pedestal. The connection device has one degree of rotation according to a first axis parallel to the face of the pedestal, and comprises the electronic connector and a concave relief. The lever is linked to the pedestal by a linkage comprising at least one degree of rotation according to a second axis parallel to the first axis of rotation. The lever comprises a convex relief corresponding to the concave relief of the connection device, and an elastic component adapted to maintain a contact between the lever and the pedestal. The lever is configured to enter in contact with the connection device after a rotation of the connection device enabled by the rotation of the latch.

10 Claims, 4 Drawing Sheets



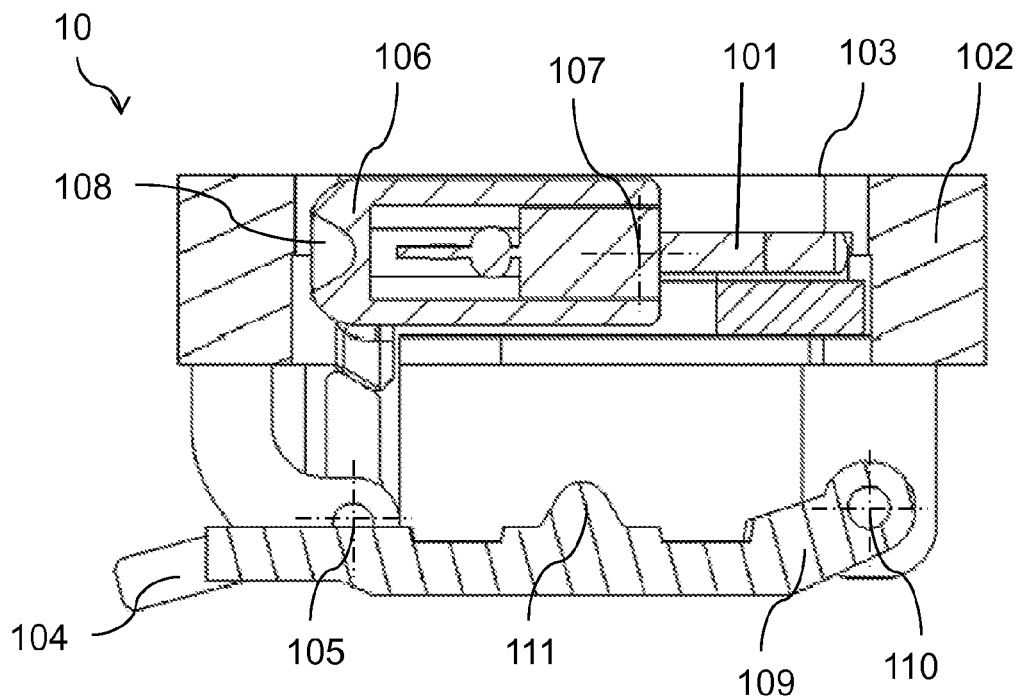


Figure 1

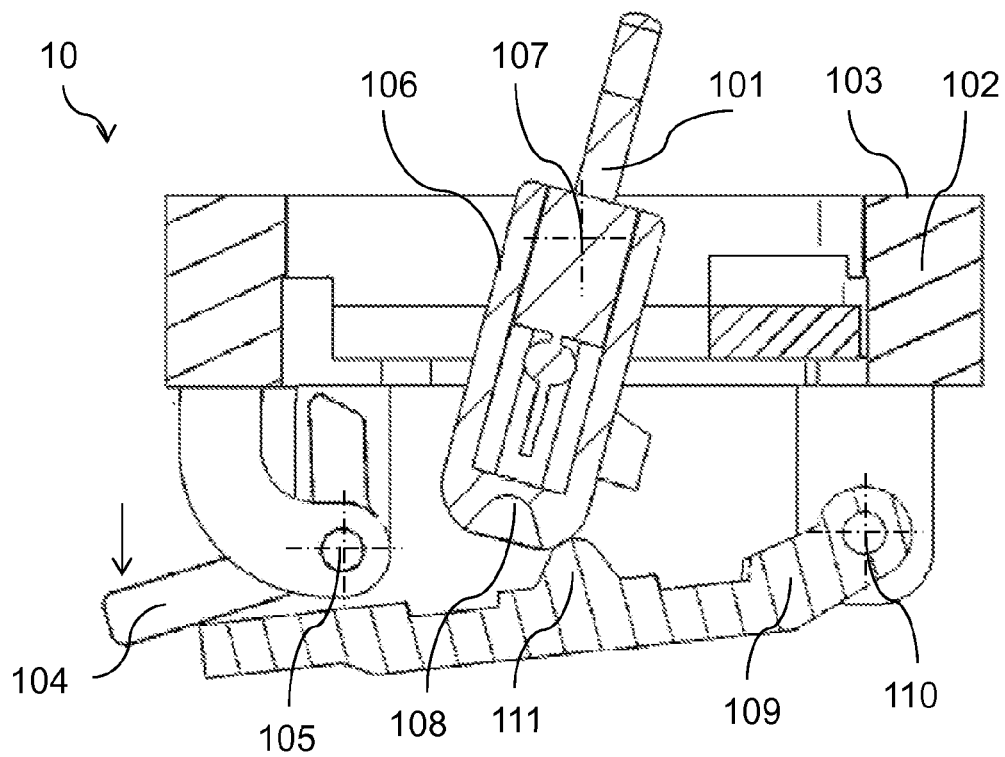


Figure 2

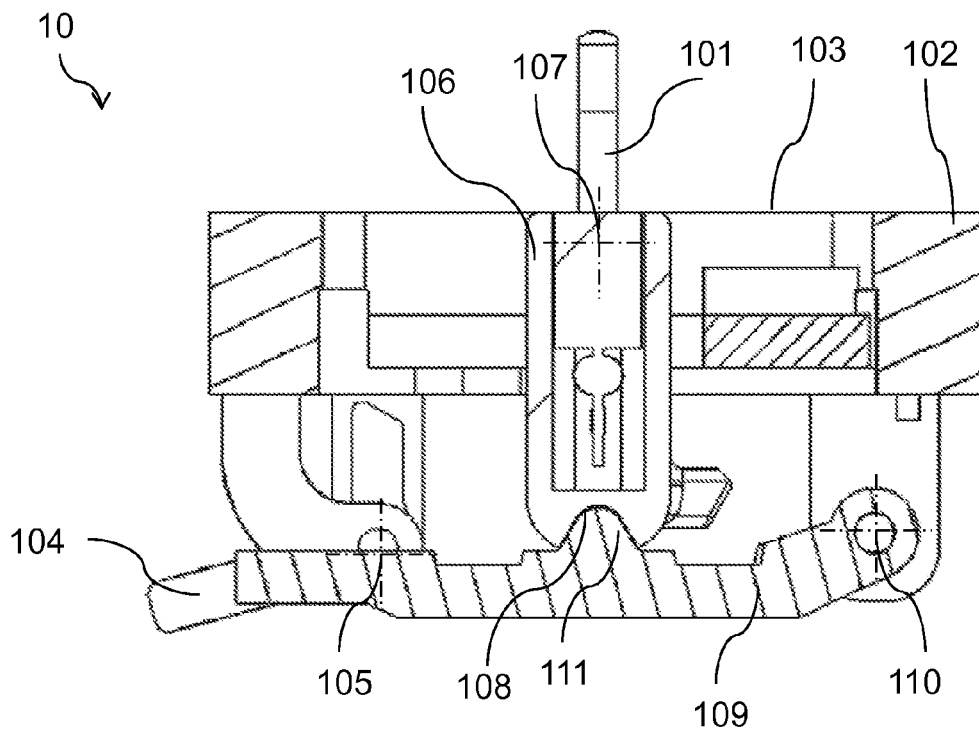


Figure 3

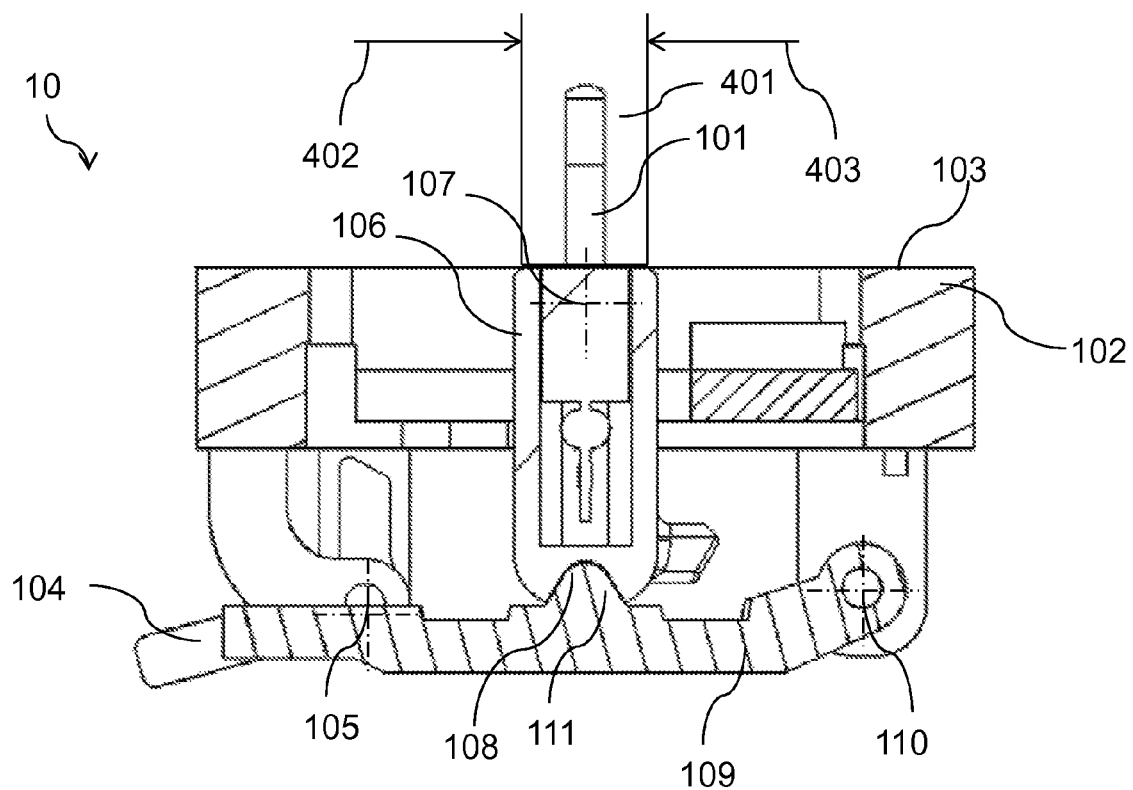


Figure 4

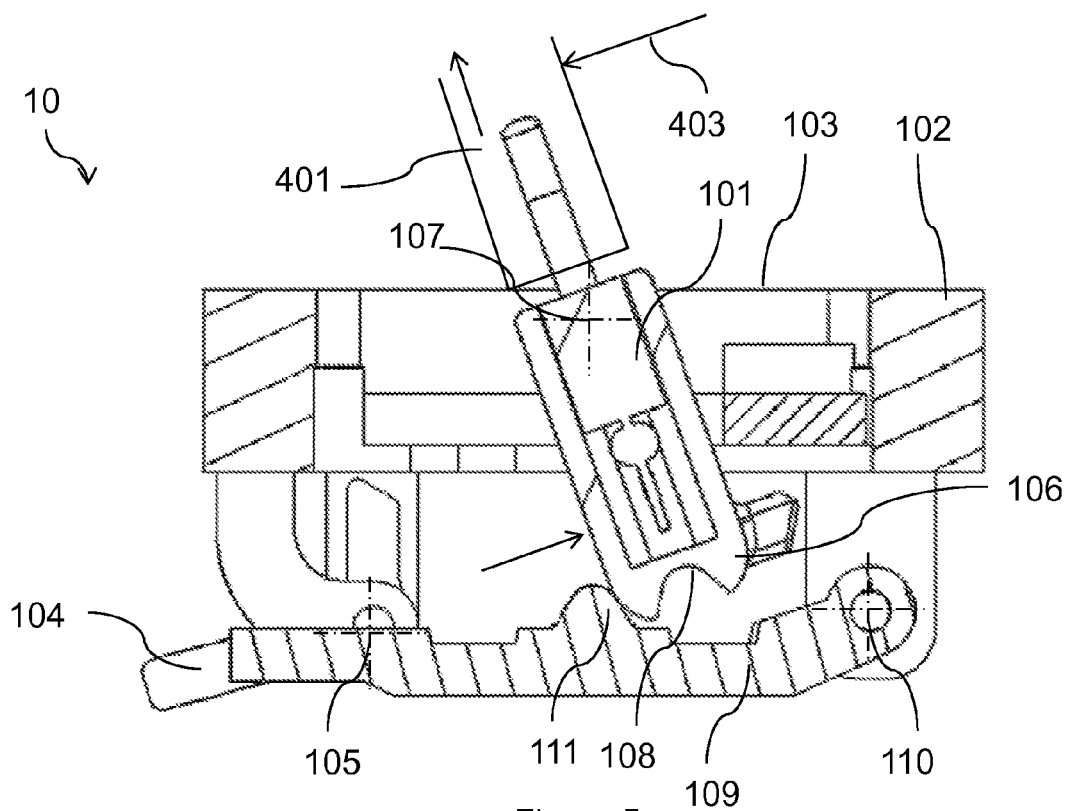


Figure 5

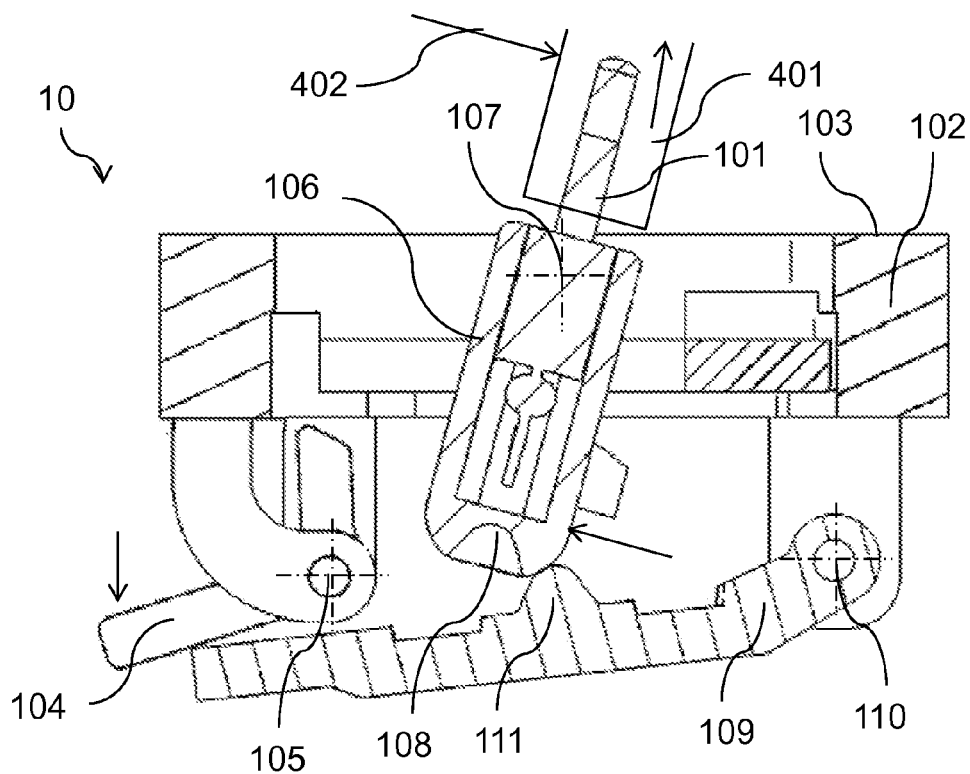


Figure 6

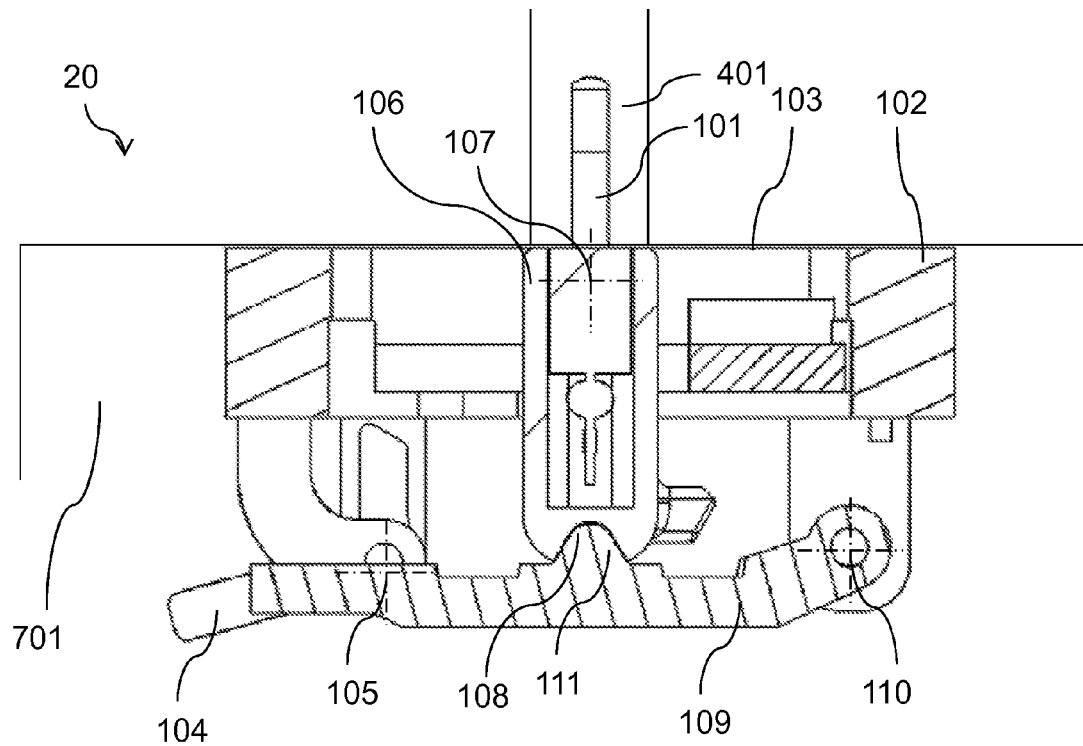


Figure 7

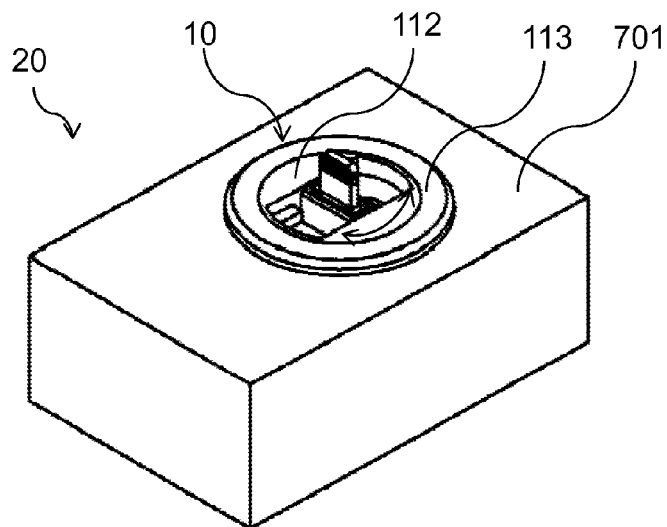


Figure 8

1

DEVICE COMPRISING AN ELECTRONIC CONNECTOR TO ESTABLISH A CONNECTION WITH AN ELECTRONIC DEVICE

FIELD OF THE INVENTION

The present invention relates to a device comprising an electronic connector to establish a connection with an electronic device pertains to the field of mechanical connections between two devices. The present invention more particularly pertains to the field of mechanical connections between two devices when an electrical connection is involved.

BACKGROUND OF THE INVENTION

In the prior art, connections between electronic devices can usually be found by connecting a fixed male connector on one of the devices to a fixed female connector on the other device. However, when an important strain is applied, one of the devices breaks.

Retractable connectors can be found in the prior art, in USB sticks for example. The retraction can be done by translation or rotation and is adapted to put the connector in a position where the connector is protected from abnormal strains. However, when the connector reaches a final position, the connector will break when an abnormal strain is applied. Moreover, both devices can be damaged.

SUMMARY OF THE INVENTION

The present invention aims at solving the above-mentioned drawbacks that are present in the solutions of the prior art.

To this end, according to a first aspect, the present invention envisages a device comprising an electronic connector to establish a connection with an electronic device. The device comprises a pedestal having a face, a connection device and a lever. The pedestal comprises a latch having a degree of rotation with the pedestal. The connection device has one degree of rotation according to a first axis parallel to the face of the pedestal, and comprises the electronic connector and a concave relief. The lever is linked to the pedestal by a linkage comprising at least one degree of rotation according to a second axis parallel to the first axis of rotation. The lever comprises a convex relief corresponding to the concave relief of the connection device, elastic means adapted to maintain a contact between the lever and the pedestal, and configured to enter in contact with the connection device after a rotation of the connection device enabled by the rotation of the latch.

The present invention presents the advantages of having retractable connection device and therefore protects the electronic connector for abnormal strains in a retracted position. In addition to that, the fitting of the reliefs on the lever and the connection device can maintain itself in a position, called locked position, enabling a connection between the device and the electronic device.

Moreover, when the connection device is in a locked position and an abnormal strain is applied, the relief of the connection device can be dislodged from the relief of the lever thus releasing the electronic device without damaging either the device or the electronic device.

In embodiments of the invention, the pedestal comprises a ring and a carriage module, the carriage module having a least one degree of rotation with regards to the ring.

The rotation enables more freedom in the connection between an apparatus comprising the device and the electronic device. Moreover, when using the electronic device

2

and the apparatus, the user can rotate the device and the apparatus in relation to each other. Also, the device may rotate when an abnormal strain is applied and prevent damages.

In embodiments of the invention, the convex relief is a right circular cone.

An advantage of these embodiments is that the connection device can be easily dislodged from the relief when an abnormal strain is applied. Also, in normal conditions of use, the position of the connection device is more stable.

In accordance with an embodiment of the claimed invention, the right circular cone comprises a fillet.

The fillet presents the advantages of having a more resistant relief and a smoother transition between the retracted position and the locked position.

In accordance with an embodiment of the claimed invention, the elastic means are a spring.

An advantage of the elastic means being a spring is that the item is easily replaceable.

In accordance with an embodiment of the claimed invention, the elastic means are linked to the properties of the material of the lever.

The elastic means being linked to the material of the lever presents the advantage of having a lever independent from the quality of other items.

In accordance with an embodiment of the claimed invention, a coefficient of friction between the connection device and the lever is higher than 0.30.

The coefficient of friction between the connection device and the lever defines the strain to which the connection device can resist before being dislodged from the relief on the lever.

In accordance with an embodiment of the claimed invention, the pedestal comprises an obstacle preventing the connection device to rotate more than 180°.

Thanks to this provision, the connection device and more specifically the electronic connector are prevented from rotating excessively and being weakened upon encountering the pedestal.

In accordance with an embodiment of the claimed invention, the electronic connector is a male connector.

An advantage of having a male connector is enabling a connection with most electronic devices such as computers and mobile communication devices.

In accordance with an embodiment of the claimed invention, the face of the pedestal is planar.

A planar face of the pedestal enables a more stable connection to most devices and a diminished volume.

BRIEF DESCRIPTION OF THE DRAWINGS

Other advantages, aims and characteristics of the present invention will become apparent from the description that will follow, made, as an example that is in no way limiting, with reference to the drawings, in which:

FIG. 1 represents, schematically, in a cross-section, a first particular embodiment of the device of the invention wherein the connection device is retracted position;

FIG. 2 represents, schematically, in a cross-section, a first particular embodiment of the device of the invention wherein the connection device in transitional position;

FIG. 3 represents, schematically, in a cross-section, a first particular embodiment of the device of the invention wherein the connection device in locked position;

FIG. 4 represents, schematically, in a cross-section, a first particular embodiment of the device of the invention wherein the connection device in locked position connected to an electronic device;

3

FIG. 5 represents, schematically, in a cross-section, a first particular embodiment of the device of the invention wherein the connection device dislodged with regards to a strain;

FIG. 6 represents, schematically, in a cross-section, a first particular embodiment of the device of the invention wherein the connection device dislodged with regards to another strain;

FIG. 7 represents, schematically, in a cross-section, a first particular embodiment of an apparatus comprising an embodiment of a device of the invention to an electronic device; and

FIG. 8 represents, schematically, in perspective, a first particular embodiment of an apparatus comprising an embodiment of a device of the invention to an electronic device.

DETAILED DESCRIPTION OF THE EMBODIMENTS

It should be noted that the drawings are not at scale.

FIG. 1 shows a cross-section of an embodiment of the device 10.

In accordance with an exemplary embodiment of the claimed invention, the device 10 comprises a pedestal 102 comprising a face 103. The face 103 is preferentially planar. The face 103 may be the face from which an electronic connector 101 emerges when the electronic connector 101 is in locked position. Preferentially, when the connection device or connector 106 comprising the electronic connector 101 are in retracted position, none of the parts emerge from the face 103.

The top part of the pedestal 102 may be the part where the connection device 106 is stored while in retracted position. The top part of the pedestal 102 may have a circular shape.

In accordance with an exemplary embodiment of the claimed invention, the pedestal 102 may comprise a stop configured to prevent the connection device 106 from rotating excessively when being retracted. The stop may be parallel to the face 103. The stop may enter in contact with the electronic connector 101 when the connector 106 is being retracted. The stop may also be an obstacle preventing the connection device 106 to rotate more than 180°.

The pedestal 102 may comprise at least a hole configured to hold at least a shaft of the connection device 106. Preferentially, there are two holes having the same axis.

In accordance with an exemplary embodiment of the claimed invention, the pedestal 102 may comprise a ring 113 and a carriage module 112. The ring 113 and the carriage module 112 have one degree of rotation perpendicular to the face 103 of the pedestal 102.

In accordance with an exemplary embodiment of the claimed invention, the device 10 comprises the connection device 106 comprising an electronic connector 101 fixed with regards to the connection device 106. Preferentially the electronic connector 101 is a male connector. The electronic connector 101 may be, but is not limited to:

- a USB (universal serial bus) connector,
- a micro-USB connector,
- a lightning connector (Registered Trademark from Apple Inc.), or
- any kind of electronic connector.

The connection device 106 may have at least one degree of rotation with a carriage module of the pedestal 102. Preferentially, the connection device 106 rotate around one axis 107. The axis 107 may be parallel to the face 103 of the pedestal.

4

In accordance with an exemplary embodiment of the claimed invention, the connection device 106 may comprise at least one shaft configured to enable the rotation of the connection device 106 with regards to the pedestal 102 around the axis 107. Preferentially, there are two shafts placed into two holes of the pedestal 102 adjusted to configure a transition fit.

In accordance with an exemplary embodiment of the claimed invention, the connection device 106 comprises a concave relief 108. Preferentially, the relief 108 is a concave right circular cone comprising a fillet.

In accordance with an exemplary embodiment of the claimed invention, the connection device 106 may comprise a slanted stop. The slanted stop may be configured to maintain the connection device 106 in retracted position. The slanted stop may be in contact with the latch 104 when the connection device is in retracted position. The surface of the latch 104 may have a slant corresponding to the slant of the slanted stop.

In accordance with an exemplary embodiment of the claimed invention, the device 10 comprises a latch 104. The latch 104 may have at least one degree of rotation with the ring 113 of the pedestal 102. Preferentially, there is only one degree of rotation around an axis 105 parallel to the face 103. For example, a pivot joint is realized by fitting a shaft comprised by the latch 104 into a hole comprised by the pedestal 102.

In accordance with an exemplary embodiment of the claimed invention, the latch 104 may have the shape of an L, wherein one part of the L comprises a slanted edge configured to enter in contact with the connection device 106, and the other part of the L may be protruding and configured to be manipulated by a user in order release the connection device 106.

In accordance with an exemplary embodiment of the claimed invention, the device 10 comprises a lever 109. The lever 109 may have at least one degree of rotation with the ring 113 of the pedestal 102. Preferentially, there is only one degree of rotation around an axis 110 parallel the face 103. For example, a pivot joint is realized by fitting a shaft comprised by the lever 109 into a hole comprised by the pedestal 102.

In accordance with an exemplary embodiment of the claimed invention, the lever 109 may comprise a convex relief 111. Preferentially, the convex relief 111 of the lever 109 corresponds to the concave relief 108 on the connection device 106. Preferentially, the relief 111 is a convex right circular cone comprising a fillet.

The convex relief 111 and the concave relief 108 may have a coefficient of friction superior to 0.30.

In accordance with an exemplary embodiment of the claimed invention, the lever 109 comprises an elastic component or elastic means adapted to maintain a contact between the lever and the pedestal. The elastic component may be configured to facilitate the contact with the connection device 106 after a rotation of the connection device 106 enabled by the rotation of the latch 104. The elastic component may be a spring. In other embodiments, the elastic means may be linked to material properties of the lever 109.

The pedestal 102 is preferentially in stainless steel and may comprise a plastic part. The part of the connection device 106 not being the electronic connector 101 may be in plastic. The latch 104 may be in brass or plastic. The lever 109 may be in brass.

FIGS. 1 to 3 describe the normal conditions of use of the device 10. In FIGS. 1 to 7, the device 10 corresponds to the embodiments of FIG. 1.

5

In normal conditions of use, the initial position of the device **10** is the retracted position as shown in FIG. **1**. The retracted position may be defined as the position of the connection device **106** wherein a connection to an electronic device **401** is not possible. In retracted position, the slanted slope of the connection device **106** may be in contact with the slanted edge of the latch **104**. The connection device **106** may be retracted and no part of the connection device **106** is protruding from the face **103** of the pedestal **102**.

FIG. **2** represents the activation of the latch **104** that may rotate and liberate the contact between the slanted slope of the connection device **106** and the slanted edge of the latch **104**. The latch **104** may also enter in contact with the lever **109** and rotate the lever away from the face **103** of the pedestal **102**, therefore, the connection device **106** can rotate into a position in which it can be locked by fitting of the concave relief **108** and the convex relief **111**.

FIG. **3** represents the connection device **106** in a locked position. The locked position may be defined as the position in which an electronic device **401** may be connected to the device **10**. The locked position may be characterized by the fitting of the concave relief **108** on the connections device **106** and the convex relief **111** on the lever **109**.

To retract the connection device **106**, the steps described in FIGS. **1** to **3** may be carried out in reverse order.

FIG. **4** represents the connection of a device **10** with an electronic device **401**. The electronic device **401** may include, but is not limited to:

- a mobile communication device such as a smartphone, a tablet, a tablet computer, a computer,
- a telecommunication device, or
- any kind of device implementing electronic features.

The electronic device **401** has a width and may have two faces, that can be parallel for example, and a perpendicular face on which may be found an electronic connector. The electronic connector of the electronic device **401** is preferentially a female connector. The face are linked by edges. The electronic device **401** may be in contact with the face **103** of the device **10**.

The electronic connector **101** of the device **10** is fitted with the electronic connector on the electronic device **401**.

In abnormal conditions of use, a strain **402** may be applied to the electronic device **401** in a direction comprising a component perpendicular to the axis of rotation **107** between the connection device **106** and the pedestal **102**. The direction of the strain **402** may be in a direction that would rotate the connection device **106** back into retracted position.

In other abnormal conditions of use, a strain **403** may be applied to the electronic device **401** in a direction comprising a component perpendicular to the axis of rotation **107** between the connection device **106** and the pedestal **102**. The direction of the strain **403** may be in a direction that would rotate the connection device **106** away from the retracted position.

The relief **111** may have a symmetrical shape. Therefore, the electronic device **401** may resist to the same value of the strains **402** and **403**. The resistance of the electronic device **401** may be due to the relief **111** and the coefficient of friction between the lever **109** and the connections device **106**. The coefficient of friction is preferentially superior to 0.30. When the relief **111** is a right angle cone, the angle at the top of the relief **111** may modify the strain **402**, **403** to which the connection device **106** can resist before being dislodged.

FIG. **5** represents the position of the device **10** once the strain **403** has become superior to the value of the strain the device **10** and/or the electronic **401** can resist or the strain **403** exceeds the strain threshold of the device **10** and/or the elec-

6

tronic device **401**. As the strain **403** increases, the lever **109** may rotate away from the face **103** of the pedestal **102** releases the fitting of the concave relief **108** and the convex relief **111** up to a point where the connection device **106** is released on the side of the relief **111** closest to the rotation axis **110** of the lever **109**. The elastic means may bring back the lever **109** into initial position.

Simultaneously, as the strain increases and the connection device **106** rotates, an edge of the electronic device **401** may enter in contact with the face **103** of the pedestal **102** and expel the electronic device **401**. Therefore, as the strain increases, the electronic device **401** is released preventing the device **10** and the electronic device **401** from being damaged.

FIG. **6** represents the position of the device **10** once the strain **402** has become superior to the value of the strain the device **10** and/or electronic device **401** can resist or the strain **402** exceeds the strain threshold of the device **10** and/or the electronic device **401**. As the strain **402** increases, the lever **109** may rotate away from the face **103** of the pedestal **102** thus releasing the fitting of the concave relief **108** and the convex relief **111** up to a point where the connection device **106** is released on the side of the relief **111** furthest to the rotation axis **110** of the lever **109**. The elastic means may bring back the lever into initial position.

Simultaneously, as the strain increases and the connection device **106** rotates, an edge of the electronic device **401** may enter in contact with the face **103** of the pedestal **102** and expel the electronic device **401**. Therefore, as the strain increases, the electronic device **401** is released preventing the device **10** and the electronic device **401** from being damaged.

FIG. **7** represents, a particular embodiment of an apparatus **701** comprising a device **10** of the present invention connected to an electronic device **401**.

The device **10** may be embedded in the apparatus so that the face **103** may not be protruding. In other embodiments the face **103** is protruding.

The apparatus **701** may include, but is not limited to:

- a digital camera,
- a dock station, or
- any kind of device implementing electronic features.

In accordance with an exemplary embodiment of the claimed invention, the device **10** may have one at least one degree of rotation with regards to the apparatus **701**. At least one degree of rotation is preferentially perpendicular to the face **103** of the pedestal **102**.

FIG. **8** represents, a particular embodiment of an apparatus **701** comprising a device **10** of the present invention.

In accordance with an exemplary embodiment of the claimed invention, the device **10** comprises a pedestal **102** comprising a ring **113** and a carriage module **112**. The ring **113** and the carriage module **112** have one degree of rotation according to an axis perpendicular to the face **103** of the pedestal. The ring **113** may be fixed to the apparatus **701**.

Preferentially, the connection device **106** may have at least one degree of rotation with the carriage module **112** of the pedestal **102**. Preferentially, the connection device **106** rotate around one axis **107**. The axis **107** may be parallel to the face **103** of the pedestal. Preferentially, there are two shafts on the connection device **106** placed into two holes of the carriage module of pedestal adjusted to configure a transition fit.

Preferentially, there is at least one degree of rotation, around an axis **105** parallel the face **103**, between the latch **104** and the ring **113** of the pedestal. For example, a pivot joint is realized by fitting a shaft comprised by the latch **104** into a hole comprised by the ring **113** of the pedestal **102**.

Preferentially, there is at least one degree of rotation, around an axis **110** parallel to the face **103**, between the lever

7

109 and the ring 113 of the pedestal. For example, a pivot joint is realized by fitting a shaft comprised by the lever 109 into a hole comprised by the ring 113 of the pedestal 102.

The axes 107, 105 and 110 may be in planes parallel to the face 103 of the pedestal 102.

While the present invention has been particularly described with respect to the illustrated embodiment, it will be appreciated that various alterations, modifications and adaptations may be made based on the present disclosure, and are intended to be within the scope of the present invention. It is intended that the appended claims be interpreted as including the embodiment discussed above, those various alternatives which have been described and all equivalents thereto.

The invention claimed is:

1. A device for establishing a connection with an electronic device, comprising:

a pedestal comprising a carrier module, a flat surface at an upper end, and a latch at a lower end of the pedestal having a degree of rotation with the pedestal;

a connection device having one degree of rotation according to a first axis parallel to the flat surface of the pedestal, and comprising an electronic connector at one end and a concave relief at the other end;

a lever linked to other lower end of the pedestal by a linkage comprising at least one degree of rotation according to a second axis parallel to the first axis of rotation, and comprising:

a convex relief matching the concave relief of the connection device; and

8

an elastic component adapted to maintain a contact between the lever and the pedestal; and

wherein the lever is configured to enter in contact with the connection device after a rotation of the connection device enabled by the rotation of the latch.

2. The device according to claim 1, wherein the pedestal comprises a ring and the carriage module having a least one degree of rotation with regards to the ring.

3. The device according to claim 1, wherein the convex relief is a right circular cone.

4. The device according to claim 3, wherein the right circular cone comprises a fillet.

5. The device according to claim 1, wherein the elastic component is a spring.

6. The device according to claim 1, wherein the elastic component is linked to material properties of the lever.

7. The device according to claim 1, wherein a coefficient of friction between the connection device and the lever is higher than 0.30.

8. The device according to claim 1, wherein the pedestal comprises an obstacle to prevent the connection device from rotating more than 180°.

9. The device according to claim 1, wherein the electronic connector is a male connector.

10. The device according to claim 1, wherein the face of the pedestal is planar.

* * * * *